

CLAIMS

1. An exercise machine, comprising:

- 2 a main frame;
 a user support pivot mount on the main frame;
4 a user support frame pivotally mounted on the user support pivot
 mount, the pivot mount defining a vertical, gravitational center line, the user
6 support frame comprising one moving part of the machine;
 the user support frame having at least a primary support and a
8 secondary support for supporting spaced positions on a user's body in the
 same relative positions throughout an exercise movement;
10 a user engagement device movably mounted on one of the frames for
 engagement by the user in performing exercises, the user engagement
12 device comprising a second moving part of the machine;
 a connecting link linking movement of the user engagement device to
14 movement of the user support frame, the connecting link comprising a third
 moving part of the machine; and
16 a load for resisting movement of at least one of the moving parts of the
 machine;
18 whereby movement of the user engagement device in an exercise
 movement simultaneously moves the user support frame between a start
20 position and an end position, the user support pivot mount being positioned
 such that portions of the combined weight of the user and user support frame
22 are distributed on each side of the gravitational centerline of the pivot mount
 in both the start and end position and only a portion of the combined weight
24 passes through the gravitational centerline during the exercise movement.

2. The machine as claimed in claim 1, wherein the primary support comprises
2 a seat pad.

- 2 3. The machine as claimed in claim 2, wherein the secondary support comprises a back pad.
- 2 4. The machine as claimed in claim 2, wherein the secondary support comprises a chest pad.
- 2 5. The machine as claimed in claim 2, wherein the secondary support comprises thigh hold down pads.
- 2 6. The machine as claimed in claim 1, wherein the primary support comprises a back pad.
- 2 7. The machine as claimed in claim 6, wherein the secondary support comprises a head rest pad and shoulder rest pads.
- 2 8. The machine as claimed in claim 1, including an additional user support for supporting a different part of the user's body from the primary support and secondary support.
- 2 9. The machine as claimed in claim 8, wherein the additional user support is mounted on the user support frame.
- 2 10. The machine as claimed in claim 8, wherein the additional user support is mounted on the main frame.
- 2 11. The machine as claimed in claim 8, wherein the additional user support comprises a foot support for the user's feet.
- 2 12. The machine as claimed in claim 8, wherein the additional user support is fixed in position relative to the first two supports throughout an exercise movement.

4 13. The machine as claimed in claim 8, wherein the additional user support
comprises hand grips.

2 14. The machine as claimed in claim 1, wherein the user support frame
defines an initial position for the user's body when supported on the frame in
4 the start position of the exercise, and a finish position for the user's body in
the end position of the exercise, the gravitational centerline extending through
6 a central portion of the user's body in at least one of said initial and finish
positions.

2 15. The machine as claimed in claim 14, wherein the gravitational centerline
of the pivot mount extends through the user's hips in at least one of said user
positions.

2 16. The machine as claimed in claim 14, wherein the gravitational centerline
of the pivot mount extends through the user's thighs in at least one of said
user positions.

2 17. The machine as claimed in claim 1, wherein the main frame has a base
and the pivot mount is mounted on the base.

2 18. The machine as claimed in claim 1, wherein the user support frame has a
base and an upright, the primary user support being mounted on the base.

2 19. The machine as claimed in claim 18, wherein the user support pivot
mount comprises a four bar linkage.

2 20. The machine as claimed in claim 18, wherein the pivot mount is located
directly beneath the primary user support.

2 21. The machine as claimed in claim 18, wherein the pivot mount is located approximately at a junction between the base and upright of the user support frame.

2 22. The machine as claimed in claim 1, wherein the user engagement device is movably mounted on the main frame.

2 23. The machine as claimed in claim 1, wherein the user engagement device is movably mounted on the user support frame.

2 24. The machine as claimed in claim 1, wherein the user engagement device comprises at least one rigid exercise arm.

2 25. The machine as claimed in claim 1, wherein the user engagement device comprises a flexible member.

2 26. The machine as claimed in claim 1, wherein the connecting link is a rigid link.

2 27. The machine as claimed in claim 26, wherein the connecting link has a first end pivoted to said user engagement device and a second end pivoted to said user support frame.

2 28. The machine as claimed in claim 1, wherein the connecting link is a flexible member.

2 29. The machine as claimed in claim 1, wherein said connecting link is adjustable in length.

2 30. The machine as claimed in claim 1, including a slide member slidably
mounted on said user support frame, the connecting link having a first end
pivoted to said slide member.

2 31. The machine as claimed in claim 1, wherein the connecting link has a first
end pivoted to said user engagement device and a second end pivoted to
4 said main frame, the user support frame being pivotally connected to said
user engagement device, whereby movement of said user engagement
device is linked to movement of the user support frame.

2 32. The machine as claimed in claim 1, wherein the connecting link comprises
a first gear toothed cam mounted on said user engagement device and a
4 second gear toothed cam mounted on said user support frame and meshing
with said first gear toothed cam.

2 33. The machine as claimed in claim 1, wherein the connecting link comprises
a cable and pulley assembly extending between said user engagement
device and said user support frame.

2 34. The machine as claimed in claim 1, wherein the connecting link comprises
a moving wedge member slidably engaged with said main frame and user
4 support frame, and said user engagement device is mounted on said moving
wedge member.

2 35. The machine as claimed in claim 1, wherein the user engagement device
is adjustable.

2 36. An exercise machine, comprising:
a main frame;
a user support pivot mount on the main frame;

4 a user support frame pivotally mounted on the user support pivot
mount, the pivot mount defining a vertical, gravitational center line of the
6 pivotal movement, the user support frame comprising one moving part of the
machine;

8 an exercise arm movably mounted on one of the frames for
engagement by the user in performing exercises, the exercise arm having a
10 user engaging portion, and comprising a second moving part of the machine;

a connecting link movably engaged with at least two of the main frame,
12 user support frame and exercise arm for linking movement of the exercise
arm to movement of the user support frame, the connecting link comprising a
14 third moving part of the machine; and

a load for resisting movement of at least one of the moving parts of the
16 machine, whereby movement of the user engagement device in an exercise
movement simultaneously moves the user support frame between a start
18 position and an end position, the user support pivot mount being positioned at
a predetermined location under the user support frame and beneath the
20 user's body when supported on the frame, such that portions of the combined
weight of the user and user support frame are distributed on each side of the
22 gravitational centerline of the pivot mount throughout the entire exercise
movement between the start and end position, only a portion of the combined
24 weight passing through the gravitational centerline during the exercise
movement.

37. An exercise machine, comprising:

2 a main frame having a base;

a user support pivot mount on the main frame;

4 a user support frame pivotally mounted on the user support pivot
mount for rotation at a location spaced above the base, the support frame
6 being designed for supporting the body of a user in a predetermined exercise
position, the pivot mount defining a vertical, gravitational center line of the

8 pivotal movement, the user support frame comprising one moving part of the
machine;
10 the user support frame having at least a primary user support and a
secondary user support for supporting different parts of a user's body during
12 an exercise, the user supports being fixed relative to one another during an
exercise movement;
14 an exercise arm movably mounted on one of the frames for
engagement by the user in performing exercises, the exercise arm having a
16 user engaging portion, and comprising a second moving part of the machine;
a connecting link linking movement of the exercise arm to movement of
18 the user support frame, the connecting link comprising a third moving part of
the machine;
20 a load for resisting movement of at least one of the moving parts of the
machine, whereby movement of the user engagement device in an exercise
22 movement simultaneously moves the user support and user between a start
position and an end position; and
24 the pivot mount being located under the user support frame at a
location directly beneath the user's body when supported on the frame.

38. The machine as claimed in claim 37, including an additional user support
2 mounted on the user support frame and being fixed relative to the user
support frame during an exercise movement so as to move with the user
4 support frame in the same orientation relative to the frame.

39. The machine as claimed in claim 37, wherein the additional user support
2 comprises at least one foot support plate.

40. The machine as claimed in claim 37, wherein the gravitational centerline
2 passes through a central portion of the user's body in at least one of the start
and end positions.

2 41. The machine as claimed in claim 40, wherein the gravitational centerline of the pivot mount passes through the user's hips in at least one of the start and end positions.

2 42. The machine as claimed in claim 40, wherein the gravitational centerline of the pivot mount passes through the user's upper thighs in at least one of the start and end positions.

2 43. The machine as claimed in claim 37, wherein the connecting link is a rigid member.

2 44. The machine as claimed in claim 37, wherein the connecting link is a flexible member.

2 45. The machine as claimed in claim 37, wherein the connecting link is adjustable in length.

2 46. The machine as claimed in claim 37, wherein the exercise arm comprises at least one rigid member.

2 47. The machine as claimed in claim 46, wherein the exercise arm comprises a pair of articulating arm members mounted on opposite sides of the user support frame.

2 48. The machine as claimed in claim 37, wherein the exercise arm comprises a flexible member.

2 49. The machine as claimed in claim 37, wherein the exercise arm is adjustable.

50. An exercise machine, comprising:

- 2 a main frame having a base;
- a user support pivot mount on the main frame;
- 4 a user support frame pivotally mounted on the user support pivot
mount for rotation at a location spaced above the base, the support frame
6 being designed for supporting the body of a user in a predetermined exercise
position, the pivot mount defining a vertical, gravitational center line of the
8 pivotal movement, the user support frame comprising one moving part of the
machine;
- 10 the user support frame having at least a primary user support and a
secondary user support for supporting different parts of a user's body during
12 an exercise, the user supports being fixed relative to one another during an
exercise movement;
- 14 an exercise arm movably mounted on one of the frames for
engagement by the user in performing exercises, the exercise arm having a
16 user engaging portion, and comprising a second moving part of the machine;
- a connecting link linking movement of the exercise arm to movement of
18 the user support frame, the connecting link comprising a third moving part of
the machine;
- 20 a load for resisting movement of at least one of the moving parts of the
machine, whereby movement of the user engagement device in an exercise
22 movement simultaneously moves the user support and user between a start
position and an end position; and
- 24 the pivot mount being positioned such that portions of the combined
weight of the user and user support frame are distributed on each side of the
26 gravitational centerline of the pivot mount in both the start and end position
and a portion of the combined weight passes through the gravitational
28 centerline during the exercise movement.